THE ZOOLOGIST

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ZOOLOGICAL NOTES FROM SYDNEY.

By David G. Stead.

(Plate IV.)

Last year (Zool. 1899, p. 407) I had the pleasure of narrating one of my zoological wanderings near Sydney. On the present occasion I propose to describe some of the objects of interest which it has been my good fortune to encounter on various rambles during the past few months.

At the time of writing the "bush" is teeming with animal life, chiefly insects, though the Reptilia play no small a part. Of the former, perhaps the Cicadas attract most attention, both by numbers and noise. It is only a few weeks since they made their appearance above ground (that is, in the city and environs), but they have been making the most of their time; and now the first thing to greet one's ears on awaking in the morning is the sound of their stridulation. Hot, still, sultry weather always suits them best, and under such atmospheric conditions, and as the season advances, they may be often heard long before daybreak, keeping up their "churr-urr-urr-urr" until about 7 or 8 o'clock, when there will be a general quietude until about 11 o'clock, when once more the concert is resumed with renewed vigour. This goes on with a few intermissions until about 4 or 5 p.m., when once more it ceases as suddenly as it began; only to start again about 7 p.m., and continuing until long after darkness has set in. I have even heard them as late as 11 p.m. I have spoken of the Cicadas as "singing." To me it is music (though most people consider it a hateful sound), recalling, as it invariably does, so many happy hours spent in roving about the bush. But even I can have too much of it. I can well remember one such occasion. It was a glorious day, with a gentle breeze and a blue sky, with the air clear and bright, when I sallied forth, making my way to the ferry which traverses that long arm of Port Jackson known as Parramatta River. I soon found plenty to interest me, as the water was in parts almost alive with Discomedusæ of several species, some small transparent ones (of a bluish tint) floating lazily along at the surface; others (*Crambessa*), of a large size and fleshy-pink colour, forging along steadily by means of the rhythmical contractions of their ciliated discs; and others, again—"man-o'-war blubbers"—which especially attracted attention on account of their beauty. These last are of a semi-transparent red tinge, the disc having all over its surface large white spots. These spots become very dense near the margin, the fringe being almost entirely white. (Recently—Feb. 4th, 1900—I observed a large number of these animals in Circular Quay, Port Jackson. Some of them had been greatly mutilated by the propellers of the many ferry-boats which ply from here. In one instance I observed a specimen swimming along serenely minus its *manubrium*, while in another there was only three-fourths of a disc, and this still contracted rhythmically.) From the borders of the disc depends, besides the usual short fringe, a large number of long white and beautiful, though treacherous, tentacles (these being thickly studded with lasso-cells). When swimming in clear water the animal possesses a most pleasing and beautiful appearance; but when one's limbs come into contact with its tentacles, as while wading, the most intense and painful irritation is set up, which lasts for some considerable time after (as I know to my cost).

After travelling a few miles I landed at my destination—Ryde, a pretty little village situated in a fruit-growing district. Several hollows in this locality are a great breeding-ground for three or four species of Cicada, notably one — *Thopha saccata*—a large species. That day I heard such a tumult of insect-life as I have never experienced either before or since. The noise was deafening. Some men who were near at hand, upon seeing me searching about amongst the stones, evidently guessed that I was on the

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look-out for zoological specimens, as they drew towards me, one of them carrying a magnificent green glittering beetle. He had to come quite close and shout before I could hear him, so tumultuous was the sound. All around on the trees (*Eucalyptus*), which were here tall and slender, were to be seen scores upon scores of Cicadas* in all imaginable stages—dingy sluggish larvæ that had just emerged from their holes at the foot of some tree, some of them just in the act of bursting from the larva-case; others, again, that had performed this act, standing or climbing slowly up the tree, waiting for their wings (which were hanging like little green globular bags full of fluid) to dry; and so on up to the beauteous-winged imago flying lightly from tree to tree. In dealing with these insects one cannot fail to notice the habit they have of spurting an acrid fluid as they fly off on being alarmed; this they eject with some degree of force, and in considerable quantity.

My attention was here attracted by the great number of large handsome red-and-black Hymenoptera (*Exeirus* sp. ?), which were attacking the Cicadas, relentlessly pursuing them from tree to tree. (Afterwards, on my road home, I came across a specimen of this large Wasp, hard at work dragging a large green and apparently anæsthetized Cicada across my pathway. Unthinkingly I separated them, for which I was immediately sorry, as I might have witnessed the performance of stowing the Cicada away in some hole for the use of its assailant's future progeny.)

Here also I observed large numbers of the Coleoptera known as "Elephant insects" (*Curculionidæ*) of two varieties, one of a uniform dark colour, and the other black and green, both kinds (*Chrysolopus spectabilis*, Fabr.) being on the branches of a large wattle-tree (*Acacia*). These wattle-trees are usually swarming with insects, notably Ants, on account of the large amount of gum which is exuded, especially from where there has been a wound. Here the vibration set up in the air by the Cicadas became so intense and so intolerable that I took to my heels, and made for the beach, so that I might gain a brief respite.

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* These consisted chiefly of five species:—*Thopha saccata*, *Psaltoda mœrens*, *Cicada angularis*, *Tibicen curvicosta* (this makes a tremendous noise, and can be heard at a great distance, though it is not very large), and, lastly, *Cyclochila australasiæ*, of which there are two varieties, one a beautiful green, the other yellow, with intermediate forms.

All along the shore were numbers of boulders which had been perforated through and through by the little Isopod crustacean *Sphæroma*, assisted here and there by a boring mollusc. These little creatures form a very powerful factor in the disintegration of the rocks, as, after they have driven their galleries through, it is quite an easy matter for the sea to do the rest. As commensals in the burrows of these Isopods, I have observed many other small crustaceans, several species of small fishes, including the Common Eel (*Anguilla australis*), and also a brown-coloured Araneid. This last—of which individuals were numerous—remains in the burrows even when the tide rises and floods them, and it may be seen moving about beneath the surface clothed in a tunic of air-bubbles.

While speaking of the seashore, I must mention something connected therewith which at once claims the naturalist's attention, and that is the zones which each animal (or set of animals) occupies. Taking a typical flat, and starting from the top, we would first come to a sandy zone, slightly above high water. This is inhabited by the beautiful "Swift-footed Crab" (*Ocypoda cordimana*), a small grey Isopod; and, in the event of there being decaying animal or vegetable matter, many specimens of the Common Sandhopper (*Talorchestia quadrimana*). Then, lower down, there is a zone just lapped at high water, about which are strewn clean stones (*i. e.* stones not overgrown with Algæ). Under these stones are to be found many interesting and exceedingly agile Crabs (*Cyclograpsus Lavauxi*). Going still lower, we come to a belt consisting of a mixture of sand and mud. On—or rather in—this we find the bright-coloured, martial-looking "Soldier Crab" (*Mycteris longicarpus*),* and an exceedingly fragile *Callianassa*. Going beyond this again, we arrive at a zone which is only just above low-tide mark. This is composed of dark evil-smelling mud, with occasionally small Algæ-covered boulders strewn sparsely over its surface. On the stones themselves (amongst the Algæ) we find some tiny Crabs (*Hymenosoma varium* and *Porcellana dispar*). Underneath will be found others and larger species, viz. *Chasmagnathus lævis*, *Sesarma erythrodactyla*, and occasionally *Pilumnopeus serratifrons*. In the mud itself are two species: *Heloecius cordiformis* and *Macrophthalmus setosus;* besides several kinds of *Annelida*. The last-mentioned Crab—*Pilumnopeus serratifrons*—I have found, is occasionally attacked by a parasite—*Sacculina*.* The parasitized Crabs which I examined were found to represent both sexes in about equal proportions, and neither the pleons nor the abdominal appendages were affected in either sex; a different state of things to that recorded by Prof. A. Giard in the case of certain European Crabs† attacked in a somewhat similar manner; and also by Prof. W. Haswell in that of an Australian species—*Nectocarcinus integrifrons*.‡

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* For further information regarding these crustaceans, *cf.* author's "Notes on the Habits of some of the Australian Malacostracous Crustacea" (Zool. May, 1898).

I have spoken of Ryde as being in a fruit-growing district, which reminds me of the Fruit-Bats (*Pteropus poliocephalus*). These are perhaps the orchard's greatest enemies. The fruit-growers of the north-western suburbs of Sydney (of which Ryde is one) have annually large quantities of fruit destroyed by these "Flying Foxes," which congregate in immense numbers during the fruit season (the present time). After a night's ravaging they mass in great numbers in the heavy timber of the surrounding bush, and may be seen hanging thickly, almost like Bees, from the tree-branches. A war of extermination is waged against them periodically by bodies of fruit-growers. Recently, in pursuance of that custom, a party of fifty-three fruit-growers from the surrounding districts drove to a known camp of the pest, carrying with them 5000 cartridges. The number of "Flying Foxes" was estimated to be between 100,000 and 120,000. A successful raid was made upon the "camp," resulting in the destruction of about 2750 animals. In another district one hundred miles north of Sydney, at a recent *battue*, twenty men killed 13,000 of the same animal, which proves what a serious pest this *Pteropus* is to the orchards; as, for every peach, nectarine, or plum that the "Flying Fox" bites, it knocks down at least a dozen.

On two occasions recently we have had, on the coast of New South Wales, the most unusual phenomenon of a dust-storm at sea. A steamer on the way from Queensland to Sydney had a peculiar experience on the passage down the coast. After leaving Brisbane, and when crossing Moreton Bay, a thick haze was encountered, which made the atmosphere so dense that it was impossible to discern the leading lights. In consequence the vessel had to anchor from midnight till 5.30 a.m., when she passed out of the bay, the buoys in the channel being made out with difficulty, even though it was daylight. This continued for some distance down the coast. When the boat emerged from the thick weather everything (including the passengers' quarters and fittings) was covered with a fine red dust which had been carried out to sea by the strong westerly wind then blowing off the land. (*Apropos* of this, I am informed by Capt. Waller, who travels between New Zealand and this port, and to whom I am indebted for some interesting specimens which I hope to mention on some future occasion, that he has encountered moths and other insects whilst quite out of sight of the land, at a distance of from seventy to eighty miles from the New South Wales coast.) The red dust, upon undergoing a microscopical examination, was resolved into the remains of innumerable *Diatomaceæ*, a fact interesting alike to the zoologist and botanist.

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* *Cf.* my "Contributions to a Knowledge of the Australian Crustacean Fauna. No. 2. On *Sacculina* parasitic upon *Pilumnopeus serratifrons*" (P. L. S., N. S. W., part iv. 1899).

† Ann. Mag. Nat. Hist. (5), vol. xix. pp. 325–345, 1881.

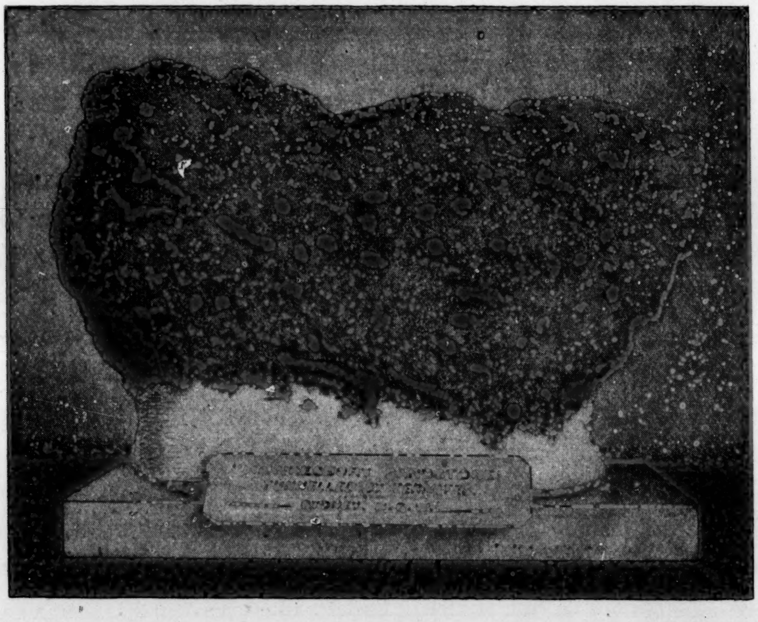
‡ P. L. S., N. S. W. (2), vol. ii. 1888.

While walking along the beach at Maroubra Bay (a few miles from Sydney), on an excursion some time ago, my attention was suddenly riveted by a very curious-looking object. This on close examination proved to be the fruit of *Barringtonia cupania*, which had evidently been in the water for some considerable time, as it was covered with stalked barnacles (*Lepas pectinata ?*), some of which were apparently full-grown. Upon its surface was also a species of *Bryozoa*. In one corner a hole had been excavated (whether by its occupant or not, I am ignorant), and safely ensconced in it was the small and widely distributed "Gulf-weed Crab," *Nautilograpsus minutus*. (For those readers who are not familiar with this branch of zoology, I may add that this famous little crustacean is believed, with good reason, to be the one which Columbus found on the floating "Sargasso Weed," and which caused him, fallaciously, to surmise that his ships were near land. However, it is perhaps almost needless to say that this was no proof, as the animal is found in nearly all the tropical and temperate seas of the globe upon floating seaweed and wood.) In the same cavity as the

Crab was a small "Sea-Mouse"; also in parts, where the husk was beginning to disintegrate, were several small brownish-black *Amphipoda*. The discovery of this current-borne *Barringtonia* is not by any means a unique one, though perhaps the finding of so many tenants is, as cocoa-nuts and other objects of interest are continually being found along our coast, which have been brought from the same far-distant source—the South Sea Islands. I have many times collected, at different points along the coast of New South Wales, small pieces of pumice and volcanic cinders. These have been continually washed up for a considerable number of years at least, as is amply borne out by the fact that they are found deep down in the grass-grown sand-dunes, whenever an opening is made (artificially or otherwise). The most interesting thing to the zoologist is that this flotsam carries with it occasionally—as I can personally bear witness—such animals as tubicolous annelids, and sometimes small specimens of coral. It is almost impossible to conceive what vast changes might be wrought, or what additions might be made, to the fauna or flora of an island lying in the course of the current which carries along this flotsam.

While on this subject I might mention some other ways by which Polynesian animals are transported to our waters. It will at once be self-evident that ships' bottoms are a very fertile agency, as there is a large amount of trade between this port and the islands of the South Pacific. Thus it is not very hard to understand how it is that fairly large specimens of Madrepores should have been found growing in Port Jackson, where they were certainly not pre-existent. Now, turning to the land-animals: our imports from the South Seas consist mainly of copra, pine-apples, bananas, cocoa-nuts, palm-leaf fans, hats, and native matting, and each of these brings along its quota of migrants. I had at one time brought to me a prettily marked Snake, alive, which was curled up in a bunch of bananas, and others have occasionally been found. But the three last-mentioned articles should perhaps claim priority for the number of Arthropoda—in the way of Cockroaches, Spiders, Centipedes, small Coleoptera, &c.—which they bring. On the other hand, I have reason to believe that many animals have been introduced from this country into the islands by means of the same agency—the ships.

During last year (1899), on several of my excursions round about Sydney, in walking over the heights, I was much struck by the curious appearance of the rocks (sandstone), which were in many cases completely honeycombed. As I am always exceedingly inquisitive about holes, I determined to "get to the bottom" of the cause. Upon making enquiries amongst my naturalist friends, I found that many others had noticed it, and it had been the subject of a considerable amount of controversy. Most seemed to favour the hypothesis that it was the work of Wasps, but a few clung to the view that it was done by the Termites. After a considerable amount of labour, I found that the tunnelling was the work of the latter insects, as I found them *in situ* and at work.* It would seem almost incredible that these little frail-looking creatures should accomplish such work as this, were it not for the fact that their depredations in houses, &c., are so well known. It was only quite recently that the weighty and apparently solid roof of the Australian Museum at Sydney was found to be in places completely honeycombed by these insects. In the course of their work they had actually bored through sheet-lead an eighth of an inch in thickness. Had the roof collapsed there would have resulted irreparable damage. The holes in the before-mentioned sandstone are beautifully uniform in size, are of great symmetry, and are lined in the



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* P.L.S., N.S.W., part iii. p. 418, 1899.

manner so characteristic of the Termites. While speaking of excavations, it might not be amiss to mention another instance. One day I was out in the vicinity of Curl Curl (near Sydney), when I suddenly observed half-way up the stem of a young eucalypt a very round hole—in fact, it was the great symmetry which chiefly attracted my attention. Upon breaking down the stem, and cutting very carefully, I found the workmen within—the beautiful Carpenter Bees (*Lestis æratus*). Now, the most interesting part of this, is, that it points to an aberration of habit, in accordance with which these Bees usually burrow into the flowering stems of the "grass-tree" (*Xanthorrhœa*). Did they mistake this small stem—of the same thickness as a grass-tree stem—for the *Xanthorrhœa?* With about half the labour involved in cutting the eucalypt, they could have burrowed three times as far in the *Xanthorrhœa*.

Some time ago, while I was on one of my periodical trips to my happy hunting-ground—Manly—I was turning over the stones on the border of the bush above the shore, when, amongst other things, I came across several specimens of a large Millipede (*Julus*). This Millipede has a row of orifices along each side, one in the middle of each somite, from which, when irritated, it ejects a brownish-coloured fluid (in appearance much resembling iodine), which possesses an exceedingly penetrating pungent odour, very irritating indeed to the mucous membrane lining the nasal passages. But the supply of this fluid—which, scarcely without doubt, is for purposes of defence—seems to become very soon exhausted, as, after I had kept the Arthropods for a short time, scarcely any of the former odour was perceptible. Under this same stone I found specimens of a beautiful little Lizard (*Lygosoma æquale*), having very short, almost rudimentary legs, and truncate, though long, tail.

A little farther along this shore is a large rock-pool, which I often visit. In it I made rather a unique discovery in the shape of a specimen of the Gastropod *Hydatina physis* in the act of oviposition. The animal itself is beautiful, but the spiral ribbons of eggs, embedded as they were in a transparent jelly-like protoplasmic substance, were, in point of intrinsic beauty, equal to anything that I have ever observed. Molluscan ova are, of course, often to be met with; but unfortunately, in very many cases, without any satisfactory clue to the species to which they belong. In the present instance, however, there could be no doubt whatever. My friend Mr. Charles Hedley, F.L.S., of the Australian Museum, informs me that they much resemble an *Aplysia* figured by Rang.

On another occasion, when at Manly, while walking along, I was very much struck with the conduct of an Ant. It saw me at the distance of a few paces. The insect was carrying what I thought to be a green leaf, but what turned out to be a comparatively large larval "Grasshopper," several times the size of its bearer. The Ant seemed to become very excited, twisting round from side to side, looking at me all the time, and holding its prey up as high as it could. It appeared as if it were challenging me to come on (which I did), and when I tried to effect its capture it dropped its burden, and made several quick springs in my direction, leaping from five to six inches at a time. Whenever I moved to one side my little antagonist followed my motions with its eyes in the same manner as does the Mantis. It looked, indeed, so uncommonly human in its actions that when I captured it I had quite a large amount of respect for it.

One morning I went to Mosman's Bay (Port Jackson), and walked from thence along the harbour coast. After walking for some distance, I observed two fishermen about to haul in their net; so I went out with them in their boat, and assisted in the unloading of the net. It was a poor haul (*i.e.* looking at it from the fishermen's point of view, but not from the naturalist's), consisting as it did almost solely of small *Discophoræ* and immature pelagic Crabs (*Neptunus pelagicus* (Pl. IV.) and *N. sanguinolentus*, *Thalamita sima*, *Charybdis cruciatus*, and *Nectocarcinus integrifrons*). There were a few specimens of *Squilla lævis*, also of the handsome Prawn *Penæus canaliculatus*, and of the smaller and commoner Prawn *P. esculentus*. There was also a goodly number of species of small fishes, the most noticeable of which were the "Fortescues" (*Pentaroge marmorata*), and two specimens of the "Stink Fish" (*Callionymus curvicornis*). The first mentioned is a harmless-looking little creature, but in reality it is just the reverse. It is armed on each side of the head with exceedingly sharp spines. When the poor unsuspecting mortal picks up one of these carelessly, it whirls round its head suddenly, and the spines inflict a wound of a very painful nature. I captured several of these, however, without being injured. Whilst thus engaged I noticed a most noisome odour arising. While I was still wondering whence this was proceeding, one of the fishermen quickly settled the point by placing one of the last-mentioned fishes under my nose. I can assure the reader that I did not allow him to keep it there many seconds. It is a most objectionable stench, and would, in the writer's opinion, serve no doubt to restrain many other fishes from preying upon this one. In general appearance the fish is not unlike the "Flathead" (*Platycephalus fuscus*), but the mouth is very considerably smaller. I found that the odour was given off from two orifices at the back of the eyes, one on each side of the occiput.

I have no doubt that the story of the s.s. 'Perthshire' will be fresh in the memories of some readers at least. The vessel, while on a five days' voyage from Sydney to the Bluff (N.Z.) during last year, broke down, and was helplessly adrift at the mercy of the elements for a period of five weeks. While she was lying disabled on the 5th of May, about five hundred miles from the nearest land—Cape Howe, N.S.W.—a common "Bronze-wing Pigeon" (*Phaps chalcoptera*) flew aboard in an exhausted condition. The alighting of land-birds on ships close in shore, when the vessels are "making the land," is not an uncommon occurrence; but that a Bronze-wing Pigeon should have found a haven on a disabled vessel five hundred miles from the nearest land is indeed singular. This Pigeon is a short-flight bird, and, although it travels long distances during the hours of a long summer's day, it does it with frequent rests. How then did this hapless Bronze-wing manage to keep up over the five hundred miles of storm-tossed sea until it reached the vessel? The flock Pigeons of the far west and interior, which come periodically in countless thousands, are tireless flyers, at times coming in such swarms that at a distance they appear like a drifting cloud; then for a year or two they are entirely absent. One of these last-mentioned birds would have negotiated the distance (especially with the strong westerly wind behind it, which was blowing from the land at the time, and had been blowing for some days) with little difficulty. The marvellous thing is that a Bronze-wing should have done it; about the least likely species of Pigeon to attempt the feat—willingly! When I saw the bird it looked very well, and none the worse for its adventures.

Before finishing my notes on this occasion, I would like to mention one more incident. While out in the vicinity of North Harbour (Port Jackson), on Jan. 1st, 1900, I made a few observations which I hope to be able to speak of on some future occasion; merely relating one of them at present. I was situated in a very pretty little nook of the harbour called Pirate's Cove, and, as atmospheric conditions were favourable, waited till night came on. I was well repaid, for, upon darkness setting in, I found that the whole of the water flooding the cove was filled with myriads of the *Noctiluca miliaris*. Here and there the wake of some fish might be traced out in silver. Then every ripple on the water was crested with light; scattered plentifully between these were little individual globes of light, and as each wavelet plashed up on the rocks or sand it would leave many *Noctilucæ* stranded. Wading in until the water was over my knees, my nether limbs suddenly became clothed with phosphorescence. As there was no moon, the whole contrived to form a most beautiful and fascinating display of Nature's pyrotechnics.

While on the subject of phosphorescence, I may mention that, while walking along Jarrah Beach (Botany Bay) recently at night time, my attention was attracted by the number of little "orbs of light" which were being washed in. At first I thought it was the *Noctiluca*, but, upon handling one, I perceived that it was hard to the touch, and therefore came to the conclusion that it was an Ostracod crustacean; nor was I mistaken, for, upon examining it when I arrived home, I found that it was a species of *Cypridina*. When first I handled one of these it gave out a most brilliant greenish light; in fact, so strong was it that I was enabled to tell the time by my watch, the whole of the dial-plate, including the "second" marks, being visible. Though I have kept the animal alive since in a bottle of sea-water, it has not emitted any more light.

While continuing our walk the same evening, my companion and myself came upon some fishermen who had just drawn in their net. It was loaded with fishes—principally small "Mullet" (*Mugil*), though there was a somewhat varied assortment of others. As usual, there were amongst them a few "Cat-fishes" (*Cnidoglanis megastoma*). In feeling amongst the fishes in a net one had to be very careful not to come into contact with these animals. They have a most repulsive appearance, but this is not all. Amongst the cirrus which surrounds the mouth are spines covered with a poisonous mucus. This mucus causes the most severe pain when introduced into the system. My attention was here drawn to a sharp coughing sound, which I found proceeded from two specimens of the "Fiddler" Ray (*Trygonorhina fasciata*). Botany Bay is a great place for many species of Sharks, Rays, and other Flat-fishes. One Ray was procured from that locality which measured fifteen feet from "wing" to "wing."

What a hideous monster is human ignorance! We have in this city bubonic plague (*Pestis bubonica*). In some of the factories hundreds of workmen have destroyed their dinner-baskets. One may well ask, "What connection is there between dinner-baskets and plague?" None whatever. That is to say, not any more than there might be with hundreds of other articles in daily use. The reason of their destruction is as follows:—Some of the men have discovered in their baskets the larvæ of the beetle which attacks this kind of ware. The beetles were there all the time, but the men had "no eyes to see" till they became possessed of the plague scare. As they did not know what the larvæ were, they came to the conclusion that their occurrence in the baskets must have something to do with the plague. Speaking of ignorance reminds me that I once observed an itinerant microscopist exhibiting to a wondering crowd a small bottle containing small fresh-water crustaceans of the genus *Cypris*, but he informed them that the animals were—Hydatids. Returning to the plague. As a consequence of our visitation by this dread enemy, an enormous amount of disinfectant has been poured daily into our drains and sewers. A great quantity of this has found its way into some of the bays of our harbour, and it has had the effect of asphyxiating thousands of fishes. The presence of all these fishes floating at the surface forms a unique and most unpleasant spectacle.

EXPLANATION OF PLATE IV.—CENTRAL FIGURE.—*Neptunus pelagicus*, M.-Edw.; mottled variety. UPPER CENTRAL FIGURE.—Tubercular-setose variety. LEFT-HAND FIGURES.—UPPER: Dwarfed cheliped. LOWER: PLEOPODA. Female; sterile female; male. CENTRAL LOWER FIGURE.—Masticatory organs. RIGHT-HAND FIGURES.—UPPER: Sternal aspects: male; sterile female; female. LOWER: Male; female; sterile female.

A SHORT HISTORY OF THE BEARDED TITMOUSE.

By J. H. Gurney.

(Plate V., Map.)

Parus biarmicus, Linn. S. N.
P. russicus, Gmelin.
Panurus biarmicus, Koch, Syst. d. Baier. Zool. p. 202.
Ægythalus biarmicus, Boie.
Mystacinus arundinaceus, Brehm.
M. dentatus, Brehm.
Calamophilus barbatus, K. and B.
Hypenites barbatus, Gloger.
Paroides biarmicus, Gray.

It is now generally admitted that there is only a single species of Bearded Titmouse, and that species stands by itself as a very well-marked genus (*Panurus* of Koch), with no nearer allies, in the opinion of a high authority, than *Paradoxornis flavirostris* of Bengal, and *Cholornis paradoxa* of China. Formerly better known as *Calamophilus biarmicus*, this curious bird is now nearly universally received by authors as *Panurus biarmicus*, but its position was for many years a moot point in ornithology, as the seven generic names at the head of my paper sufficiently indicate. Perhaps no one has done more to settle it finally than Professor Newton, who, in 1873, summed up the opinions of previous writers with his usual conciseness, and gave an excellent general account of the bird.

The "Reed Pheasant" of our Norfolk fenmen (so called from its resemblance in miniature to the nobler "longtails" of the *battue*) or "Maish [Marsh] Pheasant" as they sometimes dub it, or "Maish Tit" with a stress on the i—the *Het Baardmannetje* of the Dutch—has been regarded as a very remarkable bird, and has been the recipient of several English names.

For manifold reasons this species has long attracted the attention of naturalists, and the following notes and recollections of the bird in its haunts—which are in part drawn from an article in the Norfolk and Norwich Nat. Soc. Tr. (vi. p. 429)—are compiled from different sources.

It was discovered by the ever-enquiring author of the earliest treatise on Norfolk Birds, Sir Thomas Browne, who communicated his discovery to John Ray, who published the first notice and description in 1674, in a scarce little book of which Canon Tristram is fortunate in having a copy. All subsequent authors appear to have been ignorant of this publication of Ray's, and ignored it, and no continental naturalist describes the bird before Linnæus.

Certainly it seems as if Sir Thomas Browne could not have been cognisant of the Bearded Titmouse when he drew up his memorable List of Birds (about the year 1663), yet the bird must have been an inhabitant close to Norwich.

The picture of the Bearded Tit which Browne sent to Ray—probably delineated by the same hand which portrayed him the Manx Shearwater,*—a literary curiosity, if it existed still—is tersely described in Ray's 'A Collection of English Words not generally used,' as "A little Bird of a tawney colour on the back, and a blew head, yellow bill, black legs, shot in an Osiar [doubtless on the Yare] yard, called by Sr Tho. for distinction sake *silerella*." A concise description of an adult male.

In the 'Synopsis methodica avium,' by Ray, but published eight years after his death, the Bearded Tit finds a place (page 81) among birds doubtfully identified by Aldrovandus and others, as: "II. *Salicaria*, Gesn. *An* Silerella D. Brown? Avicula est minima; colore partim fusco, ut parte prona"; &c.

Distribution.

At the present day the Bearded Titmouse is limited to the Norfolk Broad† district, an area twenty-five by thirteen miles, of which part is marsh. Here it still breeds annually, and is found in little flocks throughout the autumn and winter, but whether

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[*] Browne also sent Ray several other pictures of birds ('Willoughby's Ornithology,' preface), but from a subsequent complaint it appears they were not returned (Wilkins' edition of Sir T. Browne's Works, i. p. 337).

[†] "Broad" is a local name for a shallow lake often surrounded with reeds, formed by the expansion of a river in former times; a "broad-water" it would be called in some counties, but in Norfolk and Suffolk it is a broad."

all these flocks are the same individuals which summer on the broads may be doubted.

In some, if not in all, of its Dutch and German habitats it is alleged to be migratory. This is the character which Schlegel and Naumann give it, and one might expect the same in England. In Normandy it is only a summer visitant, but, on the other hand, in Luxemburg it is regarded as a winter visitant, and Keulemans has known it to occur in Holland in winter.

In Belgium it appears from Dubois's 'Oiseaux observés en Belgique' (1885) to be now very rare, though still to be sometimes seen in the marshes of Flanders and Antwerp, no doubt the same causes operating to reduce its numbers as in England. As it does not go further south than the Mediterranean, or further north than Pomerania, its migrations cannot be very great, as they are confined between 37° N. lat. and 56° N. lat. Norfolk is very near its northern and its western limits. But in an easterly direction its range is very extensive, for it appears to reach right across Asia—where it becomes slightly paler—into China.

According to l'Abbé David it is "extrèmement commune dans la région marécageuse qui s'étend au sud du coude septentrional du Hoangho" (the Yellow River), and this is on the authority of Col. Prjevalsky, who brought back large collections of insects and birds from that country. ('Orn. Miscellany,' ii. p. 191.)

It is also found in Turkestan ('Stray Feathers,' 1876, p. 154), where, according to Dr. Scully, it is exceedingly common. (*Cf.* map, p. 374.)

Increasing Scarceness.

We find very little about the Bearded Tit in the early authors, but this is not singular, because of the aquatic situations in which it resides, and Latham (1783) remarks that these birds had only been observed in marshy situations, as though, their peculiar characteristics not being known, there were some who thought they might be looked for in woods and thickets!

From Sir T. Browne's day (1674) to Sir William Hooker's (Diary 1807–40) there appears to be no Norfolk mention of the Bearded Tit. Hooker, occupied with plants, merely says that it was by no means infrequent at Surlingham Broad, which was for long after a favourite locality, and where a marshman named Trent (now dead) used, I am sorry to say, to shoot a great many. Then there is John Hunt, the Norwich birdstuffer, who remarks that in 1819 there were large flocks at Burlingham (? Surlingham), Norf. and Nor. Nat. Tr. (iii. p. 260); but ten years later we find the same Hunt speaking of it as not common (Stacy, Hist. of Norf.), which the brothers Paget, writing in 1834, qualify into "common in some seasons."

Contemporary with Hunt's second statement is a very descriptive letter from J. D. Hoy to the well-known naturalist Selby, printed in the Norf. and Nor. Nat. Trans. (ii. p. 402), and which was the basis of a lengthy communication to the Magazine of Nat. Hist. 1830, p. 328. Hoy writes to Selby as follows:—

"June 23rd, 1828.—Sir, having been highly gratified in looking over your splendid 'Illustrations of British Ornithology,' and thinking that anything you had not perhaps observed in the habits of some of our birds might not be uninteresting to you, I have ventured to forward you a few observations. . . . .

"I have had several nests of that most beautiful and elegant of our indigenous birds, the Bearded Titmouse. The margins of the extensive pieces of water, called broads, in the south-eastern part of Norfolk, which are skirted with large tracts of reeds, are the favourite abode of this species: its nest is composed, on the outside, with the decayed leaves of the sedge and reed, intermixed with a few pieces of grass, and invariably lined with the top of the reeds in the same manner as the Reed Wren. It is not so compact a nest as the Reed Wren's; the eggs vary in number from four to six, pure white sprinkled all over with small purplish spots, rather confluent at the larger end; full size of the Greater Titmouse. The nest is generally placed in a tuft of grass or rushes near the ground by the side of the water ditches in the fens, sometimes on the broken-down reeds, but never suspended between the reed stems in the manner of the Reed Wren. In the autumn they disperse themselves in little parties along shore, wherever there is an acre or two of reeds; during the winter months they feed entirely on the seed of the reed, and so busily employed are they in searching for their food that I have taken them with a fine bird-lime twig attached to the end of a fishing-rod. When alarmed by any noise they drop down among the reeds, but soon resume their station again, climbing up the reed-stems with the greatest facility."

Though now slightly recovering its numbers, the Bearded Tit has become very scarce in Norfolk, and almost extinct in Suffolk. Self-interested marshmen and egg-collectors would like strangers to believe that this scarcity is owing to hard winters; but their own cupidity is one cause of the decrease, for the truth is, that Bearded Tits are not nearly so delicate as their frail appearance would seem to imply; indeed, Mr. E. T. Booth used to call them remarkably hardy, and in his 'Catalogue' says that they seem able to contend against severe weather with greater success than many much larger and apparently stronger birds. This I quite believe to be the case, for they are not tender in confinement.

Having asked the Rev. M. C. Bird, who lives among the broads, to keep notes as to their presence or absence, he being constantly on the spot, I received the following memoranda last spring:—

March 14th, 1899.—Four pairs seen.

April 14th.—A nest at Potter Heigham.

April 17th.—Three nests, with four, four, and five eggs respectively; two more nests, and a sixth taken.

April 25th.—Three nests found.

April 28th.—Additional nest with young a few days old.

May 1st.—Another nest.

May 6th.—The nest found on the 1st has eight eggs; another nest found to-day.

May 19th.—A nest with young flown.

With Mr. Bird's assistance I have compiled an estimate of the number of nests hatched off in 1898 on every broad in Norfolk where there is reason to think that there are any. This only gives a total for them all of thirty-three nests, as tabulated in the Trans. Norf. and Nor. Nat. Soc. (vi. p. 430), but the number may be slightly more. It is unnecessary to recapitulate the list, which has only a local interest, but we may assess the number of adult Bearded Tits in April, 1899, on Norfolk Broads, as certainly one hundred; but there were not more than seven nests on any one broad, and it will be a diminishing quantity unless the arm of the law is upheld. Happily there is a desire on all hands to do this, and one gentleman even negotiated for the purchase of an estate, it was said, for the sole purpose of protecting the Bearded Tits.

The following is an approximate estimate of their decrease in Norfolk in six decennial periods since 1838, but the earlier figures given are little more than a guess:—

	1838	*1848*	*1858*	*1868*	*1878*	*1888*	*1898*
Number of Nests	200	170	140	125	90	45	33

The number of broads on which they now nest is about eleven large, and ten small ones, not including Wroxham Broad, where boating has banished them, though the Grebes remain.

One cause of their decrease is that the celebrated broads are gradually, but it is to be feared surely, growing up, though there is another more potent reason. For years, prior to 1895, there was a systematic trade in their eggs, and every egg dealer and moth hunter helped himself. Such devastation was criminal, but happily it is stopped now.

Both birds and eggs are protected by law, and the remnant are already feeling benefit from the protection afforded by this salutary measure, which came into force on May 1st, 1895. The broads where the Bearded Tits have had the best chance of escaping persecution are the small private ones, and those places where the proprietors have allowed the reeds to grow instead of cutting them, thereby providing high cover, which is an asylum where many a nest may escape the keenest eye. Unfortunately for the birds, it is rather an easy nest to find, for a pair will choose one particular bed of reeds year after year rather than move away.

Since the drainage of Salthouse sea-broad in 1851, the Bearded Tit has ceased to breed there, but the reed beds in Cley, adjoining, are still large enough to attract occasional migrants. It is very likely that the examples met with by Dr. Power and others in 1895, and on several previous occasions near Cley sluice, and at Morston and Burnham further west, had crossed the German Ocean, as also those seen in a pond at Holt in September, 1898, and May, 1899. In December, 1899, four were seen at Wiveton, still further north, where they remained a month.

Habits.

In its nest, and all that concerns the Bearded Titmouse, a protective colour may readily be traced. The old cock's black moustaches (which in Mongolian specimens are narrower) are like the dark chinks in the reeds, while his tawny colouring harmonises with the brown tints of autumn, and in spring there is a bloom on his freshly moulted plumage which goes well with the bursting into leaf of all around. Nowhere is the blend of nature's harmony better seen than in the flowers, insects, and birds of the broads, where everything suits its surroundings.

It has been said that these moustaches, from which the bird takes its name, are movable, and that their play gives a peculiar animation to the bird's expression, and it is likely enough that during courtship and before the breeding season this is so. They are composed of a considerable number of feathers, and, though wanting in the hen, there is a perceptible lengthening in her corresponding feathers, which are white.

A more beautiful object than a cock Bearded Tit in April, clinging tail uppermost to a tall reed stem gently waved by each gust of wind, it is difficult to imagine. Except in the vicinity of their nests, or when curiosity gets the better of them, they are shy and inclined to hide, but by their nests they give every opportunity for inspection as they flit across one mown space after another, betraying by their very anxiety the eggs which they wish to conceal.

They become still more unsuspecting when they have young, care for which causes many a bird to defy danger; yet they have much of that strange sense which we call instinct, and which tells them to creep to their well-hidden domicile, rather than fly to it in the presence of the enemy.

If there is any wind, they are not likely to show themselves, and this has been noticed in South Russia, for a wind which is enough to wave the tops of the reeds is enough to keep the Tits at the bottom. But when all is quiet they venture to the reed-tops, and, when concealed for a shot at Wild Duck, one has in this way sometimes the delight of being surrounded by an inquisitive little flock, and this is the time to study their engaging and active ways.

The flight of the Bearded Tit may be described as laboured, as it flits rather than flies along with head rather high, in little parties just topping the reeds, and each bird half spreading the twelve graduated feathers of its heavy tail, intended to steer by, but surely incommoding rapid progress.

I have been surprised to find, when walking with an old marshman, an experienced "egger," how often he heard their notes when neither of us could see the bird, long experience in listening for the rarer, and to him profitable species, having sharpened his ear. The clear ringing of their call-notes, which one admirer compares to cymbals, and another to the mandoline, can never, says Lord Lilford, be mistaken for any other European bird by a good ear which has once heard it. By one observer the silvery notes are syllabled as "thein, thein," by another as "ping, ping," or, when alarmed, "churr, churr"; while the provincial name in the south of France is "Trintrin" (Crespon and Jaubert); but here its place is to some extent taken by *Ægithalus pendulinus.*

It is said that young Bearded Tits, after they have left the nest, sometimes nestle together in a cluster on the reeds of our broads, but this habit does not seem to have been observed on the Continent. Hoy's account of their habits has been quoted already, and need not be repeated (*cf.* letter, p. 361).

Their food is not entirely the seeds of the reed, but minute water insects and their larvæ, and one sent by me to the late Mr. Cordeaux contained a good deal of river sand. The reed-cutters have told me of seeing them searching the floating "muds" of nearly severed reed, which I have no doubt is explained by the following note:—Mr. W. H. Dikes, having examined three specimens, writes that the crops did not contain a single seed, but, on the contrary, were completely filled with the *Succinea amphibia* in a perfect state, the shell being unbroken. These shells were closely packed together, the crop of one which was not larger than a hazel-nut containing twenty, and four of *Pupa muscorum.* (Mag. N. H. iii. p. 239.)

Nidification.

The Bearded Tit is a very early breeder. Booth says: "I have on several occasions seen young birds able to leave the nest by the 4th or 5th of May, and so late as the middle of

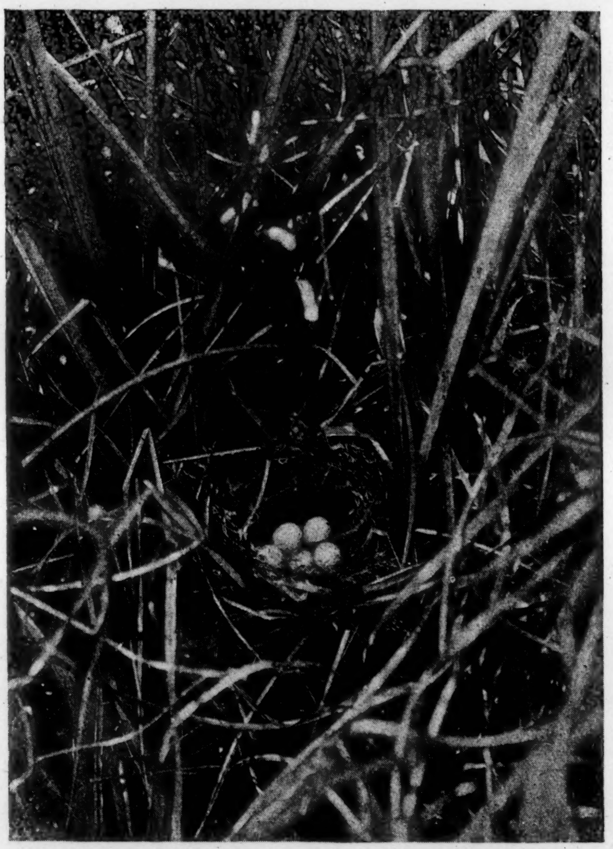
August have known the female sitting on eggs" ('Rough Notes,' vol. i. p. 83). On one occasion I found some young as big as their parents in the middle of June, and on the same day an incomplete clutch of fresh eggs, which would indicate that they sometimes breed three times in a season, the first clutch of eggs being therefore hatched in April. Besides this, the number of eggs laid by Mr. Young's tame birds, to be mentioned presently, confirms me in thinking that they breed three, possibly even four times, in a very favourable season.

After the breeding season the young form themselves into family parties, but it is certainly not the case that the males and females keep distinct (*cf.* Mag. N. H., 1829, p. 224), and such a flock as fifty together ('Birds of Norfolk,' i. p. 151) is not to be heard of now in England.

Continental authors give all sorts of sites for the nest, such as a hut built for duck shooting, but in Norfolk it is placed among reeds (never in nettles, very exceptionally in rushy grass), and is said to take eight days in construction. It is generally a foot above the ground, if a swamp can be called ground, and never, to the best of my belief, suspended. The tallest and stoutest reeds in the reed-bed are its customary support, reeds eight feet high, sometimes quite sere, while exceptionally a nest is hid in a dwarf Alder or cluster of Sweet Gale (Bog Myrtle), a shrub with that aromatic odour which prevails on a dry marsh in June, the Cuckoo's favourite perch. Here it may be remarked that, common as the Cuckoo is round most of our broads, there is no record of its egg being deposited in the nest of the Bearded Tit, which is very singular.

The nests "are extremely liable to be submerged if the tides rise suddenly, either from a heavy fall of rain or a flow of salt water up the river. In such cases the birds at once commence a second nest on the top of their first edifice" (Booth, *l.c.*). I have not personally heard of any nests being submerged, but Booth was always an accurate observer, and can be trusted.

The nest is about 2·8 inches inside diameter, and is usually composed of the brown blades of the common *Arundo*, and lined with their feathery tops. A typical nest with its surroundings is reproduced in the Norf. and Nor. Nat. Tr. (vi. p. 434), from a photograph by Mr. R. B. Lodge, who writes:—" Within fifty yards of our boat we had two nests with eggs, six each, one with young birds, and one from which young had apparently flown, and I saw the young birds early in May flying about. At one nest at which I spent half a day squatting in the same sedge bush, the cock did most of the sitting; he was easily distinguished, even at a distance, as he had no tail. They are the most fascinating birds I know, and the easiest to approach at the nest, especially when the young are hatched. All our nests were in sedge."



Nest of Bearded Titmouse (after Pike).

Other photographers have visited our broads and been successful, notably Mr. Oswin Lee ('Photographs of Brit. Birds,' pt. viii.), whose large plate is worthy of all commendation, while that by Mr. Kearton, in 'Our Rarer British-breeding Birds,' shows the eggs well in a characteristic bed of rushes. But the cleverest of all are the pictures taken by Mr. O. G. Pike (see pt. iv. of his recently published 'In Bird Land'), which, owing to his kindness, I am able to reproduce. It will be seen that in one the hen is feeding her young ones, which Mr. Pike observed that she did about every five minutes, distributing a beakful of green caterpillars equally among all. In the other plate Mr. Pike has caught the hen in the act of cleaning out the nest, which she did on about every fourth visit.

Bearded Titmouse feeding young (after Pike).

The eggs are very peculiar, and at the same time very pretty; white, with specks and wavy lines of brown, with a pink tinge when fresh, and a zone when incubated. They (the first clutch) are deposited in April, or even at the end of March possibly, and generally six in number, occasionally seven. Old Joshua, the companion of my rambles, averred that he had found two nests on the top of one another, and on another occasion twelve eggs in one nest, while a nest sent from Hickling to Mr. Frank Norgate contained ten eggs, but two of them were buried in the lining, and this year one was found at Hickling with eight eggs. Joshua had also known them to sometimes lay the first egg before the nest was finished, and then, after a layer of material, more eggs, a common habit with true Titmice (*Paridæ*). An egg taken by Joshua was placed in an incubator by Mr. Evans, of Edinburgh, to ascertain the duration of its incubation, a subject he has specially studied, but the experiment was not successful. John Smith, of Yarmouth, considered the period to be

Bearded Titmouse cleaning out Nest (after Pike).

thirteen days (Zool., 1846, p. 1497), and Tidemann fourteen. None of the small birds appear to exceed a fortnight, but in such a distinct form as *Panurus* there might be a difference of a day or two.

I can testify to its being a fact that the cock bird occasionally takes part in incubation, though this has been doubted by Keulemans, who had in confinement the beautiful examples figured in Dresser's 'Birds of Europe,' and probably ascertained from them that the duration of the moult was nearly five weeks. His excellent account of its habits as a cage bird and in a wild state in Holland is given in the 'Birds of Europe,' and again in Keuleman's 'Cage Birds,' an uncompleted work, and therefore but little known.

Description.

The adult male and female are almost too well known to need description. The prevailing colour is tawny orange, and in the cock the head is blue grey, with a black moustache on each cheek, long and pointed, with no apparent utility other than ornament. These beautiful colours are at their best from December to April 1st, after which they deteriorate. Females are never so handsome as males, and always lack the grey head, which is so beautiful: excellent descriptions are given in the 'Birds of Europe' from specimens which I supplied of both sexes. But the plumage of immaturity is far more remarkable.

For a long time after quitting the nest the young have black backs, and are cream-coloured, so that if Bonaparte gave his name of *P. sibiricus* to a young bird it was a very excusable mistake. Radde was nearly led into the same error ('Ibis,' 1889, p. 87).

It is said that young males can be distinguished by their more lemon-coloured bills. The nestling when only a day old has a brighter mouth than any other nestling bird in England, for the palate is red, with four little rows of black and white dots. Mr. Lodge tried to photograph a brood with their mouths open, but it was a failure, and my sketch is not sufficiently accurate for reproduction, indeed, it would be exceedingly difficult to give the vivid colours properly. The colour of young birds' mouths has not been sufficiently taken notice of. The nestling Blackcap's mouth is lake red, the nestling Willow Warbler's yellow, the Pied Wagtail dull yellow, and the Garden Warbler, according to Bettoni, buff. The nestling Hedge Sparrow has two black spots on its tongue, and the Grasshopper Warbler several spots (Macpherson). Probably none of these tints are lost until the young have left the nest.

Anatomy.

Under the heading of "Anatomy," I cannot do better than quote the precise description of Prof. Macgillivray, who in this branch of science especially excelled over other writers :—

"Œsophagus one inch two-twelfths long, inclined to the right, with a distinct dilatation or crop a quarter of an inch in width; the proventriculus bulbiform. Stomach a very muscular gizzard, six and a half twelfths long, seven twelfths broad, obliquely placed, with the lateral muscles very prominent, the epithelium dense, with broad rugæ, and of a yellowish colour, the right muscle two twelfths thick. The trachea as in the Passerinæ and Cantatores; its rings sixty."—(William Macgillivray.)

See also "Remarks on the Internal Structure," by Robert F. Tomes, 'Ibis,' 1860, p. 317.

In Confinement.

Since 1743, when the Countess of Albemarle brought a cageful of Bearded Tits from Copenhagen, it has been popular with bird-fanciers in this country, and the experience of all who have tried it is that it is a bird in every way to be recommended for the cage. There is no need to infringe on our native stock, for continental birds, which, in the opinion of some are finer than British, can be generally bought from Erbermehl, Abrahams, or Zache.

Mr. John Young has written one of the best accounts of this charming species in captivity (Norf. and Nor. Nat. Tr. iii. p. 519), and I am indebted to him for showing me his cage. He first of all provided them with proper nesting places and material, by sticking the tops of pampas grass round a six-inch pot of earth, a site somewhat similar to the reeds of their native haunts.

Here the eggs were laid early in the morning, and when the birds had left the nest he invariably found that the lining was pulled over the eggs. Many eggs were laid, two hens laying more than fifty in one summer, a fair proportion of which in a wild state would have been hatched.

Mr. Young thinks they might be hatched, and even the young reared in confinement, by supplying the old birds with the pupæ of the common blow-fly, which he has found to answer with Siskins, and fresh ants' eggs would probably be useful. He kept one nearly five years. Mr. Lowne, of Yarmouth, a well known prize-taker at bird shows, reared six Bearded Tits from the nest on dry ants' eggs with hard-boiled egg well sieved, but they were pugnacious enough to pull each other's tails out, and had to be separated.

Another correspondent, Mr. J. L. Bonhote, had a pair three years, and kept them in an outdoor avairy through the hard winter of 1895. In 1896 the hen built a nest with materials brought her by the cock, and, commencing on April 14th, laid a clutch of seven eggs, two of which were hatched on the thirteenth day, and the young grew well, but died suddenly on the seventh day when beginning to shoot their feathers.*

Former Breeding Area.

In the accompanying Map (Pl. V.) the pink colour is intended to show where this species formerly bred in England, an area which must always have coincided with the reed beds suitable to its requirements, which, prior to the draining of the great Bedford Level in the early part of the seventeenth century, were much more extensive than they are now. Of the nineteen spots marked pink in the map, only one is still a breeding-place at the present day, which is a somewhat sad reflection; while the old haunts on the Thames have long been deserted, though still sometimes referred to in books.

As it is a good plan to summarise what is known about any British bird's distribution (as Fatio and Studer are doing for Switzerland and Ternier for France), I have given at some length, from such sources as are still available, what can be gathered from authors about the Bearded Tit in the Norf. and Nor. Nat. Trans. vi. p. 429, and the following further particulars may be added. It only breeds in Norfolk, and the only other counties in which it is still to be found with any sort of regularity are Suffolk and Cambridgeshire.

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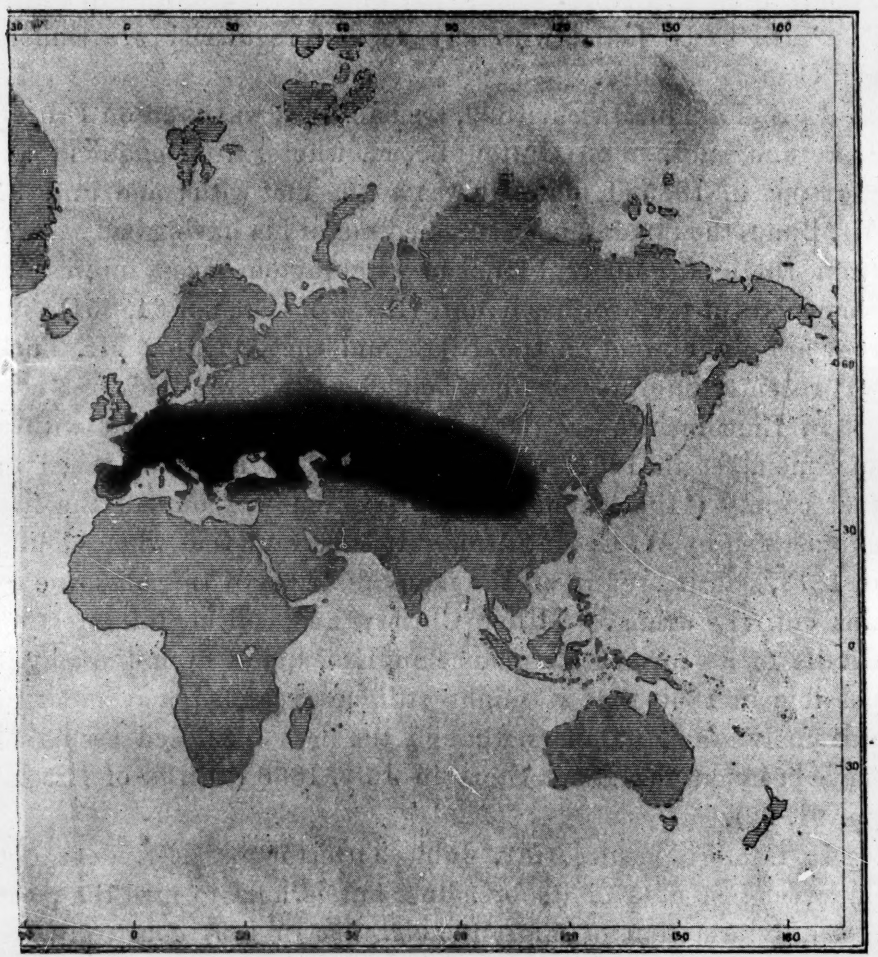
* Mr. Bonhote has just published an article on this subject (*cf.* 'Avicultural Magazine' for August.

In Suffolk, in March, 1899, a small flock was seen on Fritton Lake and another on Oulton Broad, where, from enquiries on the spot in 1885, I found it was to be met with; and in 1891 Mr. Bunn, the taxidermist, informed me of his having had several from there at different times. Babington gives interesting particulars of their former haunts (Birds of Suff. pp. 64, 251), but they are now extinct on the Blyth and the Alde, but Mr. Tuck was recently informed of some being on the River Lack.

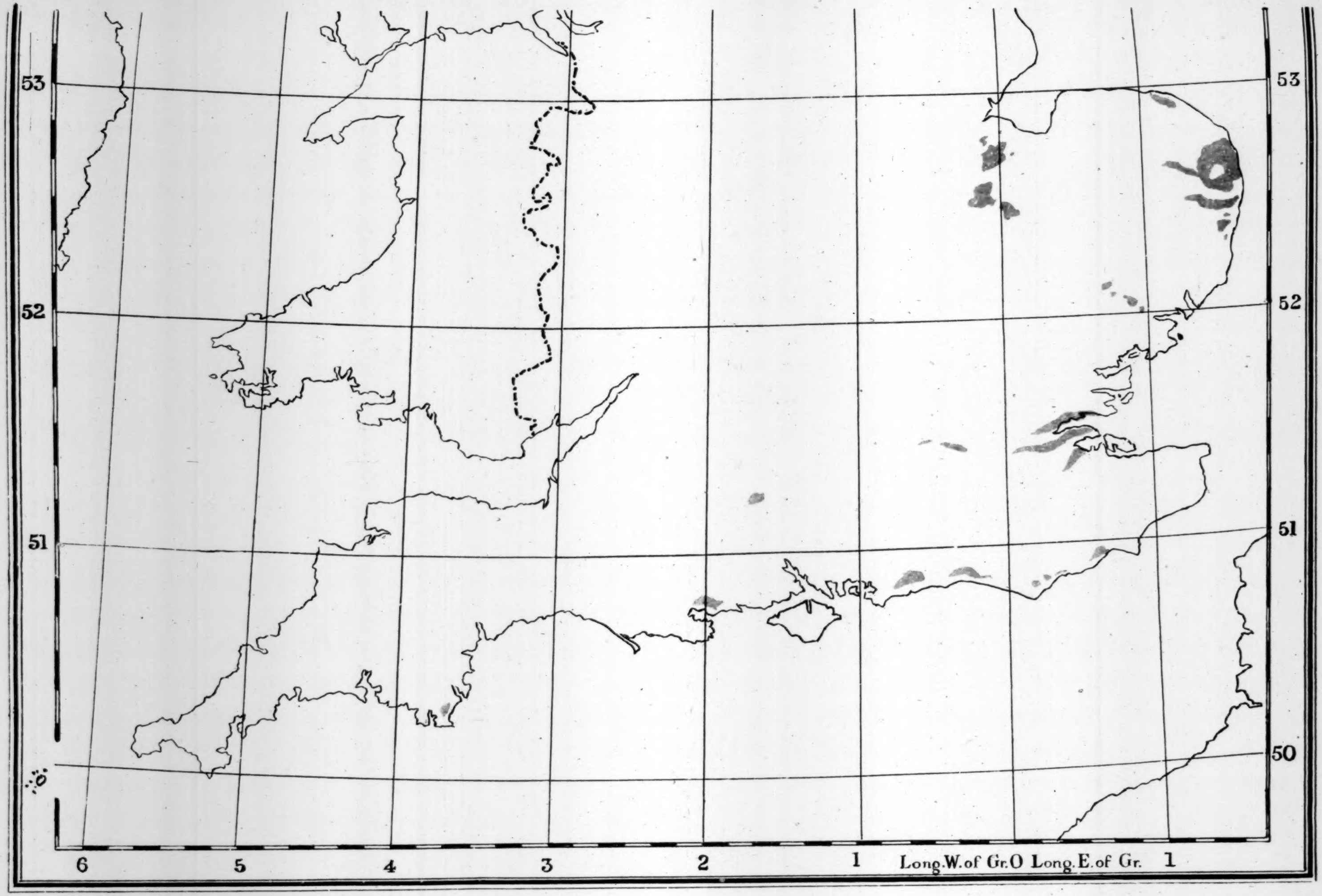
In Lincolnshire the late Mr. Cordeaux never met with a specimen, yet in 1864 A. G. More thought it might breed in that county ('Ibis,' 1865, p. 120), which was one of the five enumerated by W. C. Hewitson. It is certain that when Gould, in 1873, said it bred in all the fenny districts of Lincolnshire, he was entirely wrong. Miller Christy has collected interesting details of its former abundance in Essex, and even thought it possible in 1890 that it might still be reckoned a resident in extremely small numbers, though the last identified seems to have been on the River Stort in July, 1888 ('Birds of Essex,' pp. 91, 92).

In Cambridgeshire, Mr. John Titterton, of Ely, does not know the last date of its breeding, but is able to give the most recent information of migrants, *viz.* that in 1897 fourteen were seen, and in 1898 a flock of five, and again in December, 1899, a flock of about a dozen, which remained for more than a month in one place. These, however, by the end of January, 1900, had been so upset by the harvesting of the reeds that only three or four remained. In the palmy days of Whittlesea Mere they must have been abundant, but Whittlesea is a thing of the past. A pair obtained there in 1841 are in Newcastle Museum, and it is on record that this locality furnished a white variety.

For Surrey, some additional particulars are given in the 'Birds of Surrey,' by J. A. Bucknill, who remarks that authors have regarded the Bearded Tit as having been a resident at one time in Surrey, but he has not been able to discover any evidence of such being the case.



General Distribution. (*Cf. ante*, p. 360.)



FORMER BREEDING RANGE IN ENGLAND
OF *PANURUS BIARMICUS.*

West, Newman lith.

A VISIT TO LUNDY.

By F. L. Blathwayt.

Lundy has from time to time been visited by several eminent ornithologists, who have published accounts of the birds they noticed; but, with the exception of the pages relating to birds in Mr. J. R. Chanter's monograph on the island, published in 1877, I have not been able to find any attempt at a complete list of the avifauna of Lundy. A notice therefore with regard to the birds I came across during a recent visit may be useful to anyone contemplating the formation of a full list of the birds of Lundy, and may also interest some of the readers of 'The Zoologist.'

After being detained two days at Instow by the stormy weather, I was at last able to cross to Lundy on May 5th of the present year, in the sailing vessel 'Gannet,' which takes the mail from Instow to the island every week.

Lundy, which, with the exception of the south-east corner, consists almost entirely of granite, rises from 300 to 500 ft. out of the sea, and lies in the entrance to the Bristol Channel, about twelve miles north-west of Hartland Point, its nearest point on the mainland. It is about three miles in length, and less than a mile in width in its broadest part. The southern portion of the top is under cultivation, but the greater part is moorland, and covered with heath, furze, and coarse grass, with large granite boulders protruding in many places, especially at the northern end. On the eastern side the land slopes towards the sea, and is covered in many places with tangled masses of bramble and bracken, out of which rise here and there huge piles of granite, some of them taking very fantastic forms. There are very few landing-places, the best being at the south-east corner, where there is a shingly beach in a natural harbour; but even here it is difficult to get ashore with dry feet, if the wind happens to be in the east.

The cliffs on the western side are for the most part higher and steeper than on the eastern, and consequently these are the favourite haunts of the cliff-birds for which Lundy is famous. When I arrived, on May 5th, I was told that all the birds had not yet come in from the sea, but during my short stay they arrived daily in large numbers, and by May 11th, the date on which I left, most of the sea birds must, I think, have settled down in their summer quarters. On May 7th particularly, which was a fine warm day, I noticed the Puffins coming in from the sea to the island in a continuous stream.

I was most anxious to find out whether the Gannet (*Sula bassana*) still nested on Lundy, and was pleased to find a few on the island, though I fear they are in great danger of extermination. Three pairs were building near the lighthouse at the northern end, and, if they are not disturbed, their numbers will no doubt increase. From what I hear, however, it is very seldom that they manage to take away any young, as the eggs have a market value of one shilling apiece. The history of the Gannets on Lundy is not pleasant reading for a lover of birds. In former times they inhabited an island off the north-east end, still called after them "the Gannet Rock." They were so persecuted, however, that they deserted this rock, and tried to establish themselves on the island itself; while some are thought to have migrated to Grassholm, an island off Pembrokeshire, where there is at present a small colony. The Gannets which remained on Lundy unfortunately did not escape persecution by their change of quarters; but in spite of this they persevered, and, from what I can gather from the islanders, there were about thirty pairs of breeding birds as lately as six or seven years ago. Unfortunately for the birds, the very spot they had chosen on which to build their nests was selected for the erection of the new lighthouse at the northern extremiy, which, I believe, was opened towards the end of 1897. The quarrying and blasting operations which attended the building of this lighthouse necessarily disturbed the Gannets, though some few pairs seem to have clung to their old haunts, even while the work was in progress. Their numbers seem now to have dwindled down to the three or four pairs which I saw this year, and it is earnestly to be hoped that they will not be driven from this their only known nesting-place on English ground. The few remaining pairs seem to have learnt wisdom by experience, and have selected a place where only bold climbers could reach their nests. Formerly, I am told, they built their nests in places where any child could take their eggs without danger.

The building of the lighthouse and the noise of the fog-horns seem to have disturbed all the sea-fowl at the northern end of the island, and their numbers are said to be far smaller than in former years. Puffins, Guillemots, Razorbills, and Kittiwakes, however, still breed on the island in enormous numbers.

The Guillemots (*Uria troile*) have their colonies chiefly on the northern half of the western face of Lundy, where, in company with Razorbills (*Alca torda*), and Kittiwakes (*Rissa tridactyla*), they may be seen standing in rows, or packed closely together in bunches, wherever they can find a foothold on the cliffs. I noticed in particular one tall rock which was flat at the top, and on this the Guillemots were packed almost as closely as they are on the famous "Pinnacles" at the Farnes during the breeding season.

The chief colony of the Puffins (*Fratercula arctica*) is at the northern end, where the birds burrow in the soft soil among a *débris* of huge granite boulders scattered about in wild confusion. The number of the birds must be enormous, as, when one approaches the colony, all the rocks and the sea beneath appear to be covered with Puffins and Razorbills; while hundreds more are swinging round and round in a large circle, which extends some distance over the water. I was much struck by the remarkable tameness of the birds. As long as I kept fairly still they appeared to have no fear at all, and in a few minutes I had Puffins and Razorbills all round me, and some almost within arm's length. One Razorbill perched on the very stone which I had selected as a seat.

The Kittiwake is by far the most numerous of the Gulls on the island, and their chief quarters are on the north-west side in company with the Guillemots, and in two clefts at the north end. Their nests appear to be stuck against the faces of the cliffs, and on some of the most precipitous rocks it seems wonderful how the birds manage to get any hold at all.

Besides the Kittiwake, three species of Gulls breed on Lundy —the Herring-Gull (*Larus argentatus*), and the Lesser and Greater Black-backed Gulls (*L. fuscus* and *L. marinus*). There are colonies of the two former species in suitable places all round the island, but in numbers the Herring-Gulls are superior, though to no very great extent. At the time of my visit the birds had just commenced laying. The Greater Black-backed Gull is much rarer, and I never saw more than four or five together. There are probably not more than six or seven pairs of these fine birds on Lundy, where, I am told, they usually select one of the rocky islets on which to place their nests.

I frequently saw one or two Common Buzzards (*Buteo vulgaris*), but could not be sure that there were more than one pair on the island. From the behaviour of the birds, I was convinced that there was a nest on the face of a certain cliff, though I was unable to locate it exactly. This species is happily still fairly common in North Devon, and early in April last year I saw no fewer than eleven during a day's ramble along the cliffs. On more than one occasion three could be seen on the wing at the same time.

But to return to Lundy. I noticed that Kestrels were fairly common, and I discovered the eyrie of a pair of Peregrines (*Falco peregrinus*) by accidentally startling the Falcon from the face of a steep cliff. She was quickly joined by her mate, and the two birds circled above my head, keeping up a continuous chattering cry as long as I remained in the neighbourhood of their stronghold. Another pair had, I think, established themselves at the opposite end of the island near the Shutter Rock. This Falcon may often be seen on the Devon coast opposite Lundy, and a pair can frequently be observed on Baggy Point.

A pair or two of Ravens (*Corvus corax*) are said to nest on Lundy, but by the time of my visit (early in May) they would probably have taken off their young, and I only noticed a single bird. This bird still nests on many of the bold rocky headlands of the North Devon coast.

Some years ago, it is said, a feud broke out between the Peregrines and Ravens on Lundy, and one of the aerial conflicts which were continually taking place ended in disaster to one of the Ravens, which, failing to elude the Falcon's fatal "stoop," was struck down into the sea and drowned. I have noticed that wherever these two species nest in close proximity, duels in midair are of continual occurrence, but, as a rule, they do not appear to be attended with much bloodshed.

The Carrion-Crow (*Corvus corone*) breeds on the island, and is not uncommon. After the young have left the nest, twelve or more of these birds may be seen together. The Rev. H. G. Heaven, proprietor of the island, told me that a few years ago one or two Hooded Crows (*C. cornix*), usually only autumn and winter visitors, remained during the summer, and he thought that they interbred with the Carrion-Crows. This supposition is in a measure confirmed by the fact that I saw several birds on the island which to all appearance were hybrids between the Carrion and Hooded Crows.

The Jackdaw (*C. monedula*) is only a visitor, as is also the Rook (*C. frugilegus*), and neither species has been known to breed on the island; while the Chough (*Pyrrhocorax graculus*), formerly common, has now been quite exterminated. Their final disappearance is said to be due to the persecution they received from the men who some years ago were engaged in quarrying granite on the eastern side of the island. One of the islanders told me that in former years he often saw small flocks of Choughs flying about the fields, but that they no longer nested on the island. The price which may be obtained for the skins and eggs of these birds has done much towards banishing them from many of their former haunts, but I believe a few pairs may still be found on some parts of the Devonshire coasts.

Of the smaller land birds, the commonest, during my visit, were perhaps the Linnet (*Linota cannabina*), Wheatear, Skylark, and Meadow Pipit; while the House-Sparrow, formerly only a visitor, has now established a flourishing colony on the buildings of the Manor Farm.

The following birds I also identified on Lundy during my short stay:— Song-Thrush, Blackbird, Whinchat, Stonechat, Greater Whitethroat, Willow-Wren, Hedge-Sparrow, Wren, Yellow Wagtail, Rock-Pipit, Swallow, House-Martin, Sand-Martin, Goldfinch, Yellow Bunting, Cirl Bunting, Starling, Swift, Cuckoo, Cormorant, Shag, Corn-Crake, Lapwing, Golden Plover, Dunlin (the last two birds both in breeding plumage), and Oystercatcher.

The Manx Shearwater (*Puffinus anglorum*) is also well known on Lundy, where it probably breeds, and the same remark very possibly may be applied to the Storm Petrel (*Procellaria pelagica*). These two species often escape notice owing to their nocturnal habits, but the weird cries of the former are said to be often heard by the islanders during the night.

Mr. Heaven told me of a tradition which still exists on the island relating to the former occurrence of a bird which, if not simply mythical, could be none other than the Great Auk. The story is, I think, worth repeating, but must, however, as Mr. Heaven impressed upon me, be taken for what it is worth. As far as I can remember it runs as follows:—About the year 1839 one of the men on the island brought in a large egg (which was kept by Mr. Heaven's family for some time until unfortunately broken), which he declared belonged to a "King Murr" (on Lundy Guillemots and Razorbills are both known as "Murrs"). The "King Murrs," the man said, were birds like "Razorbilled Murrs," only much larger; he did not think they could fly, as they were only seen near the water, into which they scrambled from the rocks when disturbed. There were only one or two pairs ever seen, but they had long been known on the island. A fuller account of this same story is, I believe, to be found in 'The Zoologist' for 1866,* though I have not the means of looking up the exact reference. The story is interesting, though it cannot be said to prove that the Great Auk was ever an inhabitant of Lundy.

I would advise anyone interested in birds, who may chance to visit Lundy by excursion steamer, to spend the two or three hours allowed on land in exploring the coast-line of the northern half of the island. It will have to be done hurriedly in the limited time at the tourist's disposal, as it takes about an hour to walk from the landing-place to the North Lighthouse. If time does not allow a visit to all the cliffs on the north-west side, where the Guillemots and Kittiwakes chiefly congregate, the visitor would do well to follow the rough track on the top of the island to the north end, where he may see the large colony of Puffins and Razorbills, which to the bird-lover is perhaps the most interesting sight which can be obtained on this picturesque island.

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* At page 100, written by the Rev. Murray A. Mathew.—Ed.

NOTES AND QUERIES.

MAMMALIA.

Lesser Shrew and Bank Vole in Berks.—I have never met with either of these little mammals in the part of Berkshire with which I am most familiar. Their congeners appear to be common enough. I should like to know whether either species has been satisfactorily identified as occurring in Berkshire. The *Microtus glareolus*, or Bank Vole, is no doubt found in Berkshire, though I have never chanced to come across it; but as regards *Sorex minutus* (the Lesser Shrew), its occurrence is not so probable. Any information therefore would be welcome. — W. H. WARNER (Fyfield, near Abingdon).

AVES.

Note on the Nesting Habits of the Sparrow-Hawk.—The Sparrow-Hawk (*Accipiter nisus*) is such a well-known bird that it seems hardly possible that any of its habits and ways should have escaped the notice of so many observers. Yet the following fact in the nesting economy of this Hawk still appears—as far as I know—to stand unrecorded. My knowledge of the Sparrow-Hawk has been confined chiefly to the eastern part of Fifeshire, in Scotland, where the bird is common and generally met with. When out looking for the eggs of the Long-eared Owl, in the latter days of March or the beginning of April, we used on these occasions to have a look round in those parts of the woods to which the Sparrow-Hawks returned from year to year with almost unfailing regularity for the purpose of rearing their young; and as a result of these observations we found that, though the Sparrow-Hawk does not, as a general rule (in Fife), begin to sit till the second or third week in May, she invariably begins to build her nest about the first week in April, or even, should the weather be warm, in the last days of March. At this time the outer rim only (composed, as a rule, of larch-twigs) of the nest is completed, and is so left until about a week before the laying of the first egg, when the bowl is added, this latter being generally made of small birch-twigs, and lined with pieces of Scotch fir and bark about the size of a florin. The nest was invariably placed on a branch well out from the main trunk, though more rarely in the "breek" of the tree. The tail of the sitting bird was generally to be seen projecting over the edge of the nest. It would interest me to know if this strange nesting habit of the Sparrow-Hawk has been noticed elsewhere.—A. H. MEIKLEJOHN (Highworth, Ashford, Kent).

Nesting of the Hobby in Shropshire.—In 'The Zoologist' for March last (*ante*, p. 143), I noted that the Hobby (*Falco subbuteo*) nested in 1899 near Ludlow. My friend Mr. J. Palmer, who originally found the nest, has just informed me that the pair have returned this year, and laid again in the identical spot. The eggs were taken June 30th, but, as last year, they have laid again, and are being allowed to rear the brood. The Hobby is known to return year after year to the same nest, but the habit is curious, inasmuch as it does not build a nest for itself. In this case the nest is an old Crow's. Another pair of Hobbies are haunting the vicinity, and a male was shot five miles away on July 3rd. These three are probably the young reared there last year. I trust they may be spared.—H. E. FORREST (Bayston Hill, Shrewsbury).

Curlew Nesting in Surrey.—I have just heard of a Curlew's nest (*Numenius arquata*) being found in the spring of 1896 on Chobham Common, about twenty-eight miles from London, two eggs from which are now in the possession of a Mr. Tice. Has the Curlew ever been known to nest in Surrey before? I have seen the two eggs, and they are certainly those of a Curlew.—SPENCER H. LE MARCHANT (Chobham Place, Woking).

[In Mr. Bucknill's 'Birds of Surrey' it is stated that in 1893, "during the whole of the summer, a pair were noticed near Frensham, which probably had a nest on the moor (*Streatfield in lit.*)."—ED.]

Variations in the Notes and Songs of Birds in different Districts.—The above subject is one which seems to have been noticed very little by ornithologists; in fact, I never remember seeing more than one reference at all to it. If this variation was slight, it would be possible for it not to have been noticed by naturalists; but this is not so, the differences being so marked that I cannot believe it has escaped the notice of those who know all the notes and the song of all birds they have come in contact with. It does not appear to me to be a difference in the way the song is put together, but rather that the note is in a different key, and therefore the first time you hear it you are apt to be misled into believing it is entirely a different bird. If it were only in the resident bird that this variation existed, it might be explained by the climate; but this is not so, the differences being much more marked in the summer migrants than in the more resident species. Then, again, it does not exist in all birds, and the explanation of it puzzles me. Taking the two districts that I am best acquainted with—that is to say, Worcestershire and Co. Donegal—I will give the difference as it appears to me. The notes and songs of all birds in which this variation exists are in a lower key in Donegal than Worcestershire, and the birds in which it is most marked are the Cuckoo and the Whitethroat, the latter appearing at first to have an entirely different song. After these two the change is most marked in the Chaffinch, Hedge-Sparrow, Wren, and Blackbird; while in the Willow-Wren (the only other Warbler I have listened to in the west of Donegal) I could notice no change whatever. Comparing these two counties with the district round Loch Lomond, there is again a difference, and the Whitethroat is once more the most marked, appearing to have a song between the other two. I should be glad if others would give their experience. — H. E. HAWARD (Clarelands, Stourport).

AMPHIBIA.

Rana temporaria in the Scilly Islands.—Previous to my taking a trip to the Scillies last month, I made some enquiries respecting their fauna, and was informed that no batrachians were recorded from these islands. I was fortunate, however, whilst on St. Mary's, in taking an example of the Common Frog (*R. temporaria*), which, although in itself no rarity (being a very ordinary female of the reddish variety), was certainly an interesting capture for locality's sake. It was taken on some boggy land (lying east of the town of St. Mary's), known locally as "the moors." The islanders seem well acquainted with Frogs, but say they are rare. A boatman told me he remembered years ago seeing them spawning in a pond on Bryher Island. I visited this place, but without success. Whether their "Frogs" also includes Toads, I could not discover, but probably the same confusion exists between the two animals here as in other parts of the country. Newts appear to be quite unknown, as are also Snakes and Lizards. It is probable that by carefully working suitable districts other batrachians may turn up, but unfortunately my time was too limited to do this.—F. W. TERRY (102, Kingston Road, Wimbledon, S.W.).

[Borlase, in his 'Observations on the Ancient and Present State of the Islands of Scilly,' published in 1756, states:—"There is no Adder, or venomous creature of any kind to be found in these islands."—ED.]

NOTICES OF NEW BOOKS.

Text-book of Zoology, treated from a Biological Standpoint. By Dr. OTTO SCHMEIL. Translated from the German by RUDOLPH ROSENSTOCK, M.A.; edited by J. T. CUNNINGHAM, M.A. Part I.—Mammals. Adam & Charles Black.

SUCH a series of publications on zoology—text-books, handbooks, introductions, manuals, &c. — is now appearing, that it seems only possible to suggest at present what shall be considered canonical, and what not. And this estimate becomes more difficult every day, especially when, as in the present work, the bionomical element is a pronounced feature; for now many brilliant, some hazardous, and a multitude of strange theories more or less enter the purview of every author. The editor—Mr. Cunningham—in his preface, opines that even in this volume, in reference to colouration, the author's idea is perhaps carried too far. But Dr. Schmeil advances no particular theory, and is anxious throughout to exhibit adaptability in structure to environmental conditions in a way that could have met with the approval of the—presumably—defunct teleologist, that ought not to offend the strictest "selectionist," and may be countenanced by the "neo-Lamarckian."

But these remarks, though legitimate to a general consideration, in no way express the aim of the book, which is one of the most interesting and suggestive to place in the hands of school-children, to whom zoology is not an end, but a part of a liberal education. It has the merit of producing thought, rather than the necessity of remembering details. Most children can repeat that a Cat "has nine lives," but how few can explain the operation of what is styled "always falling on its legs." Dr. Schmeil comes to the rescue:—"When a man in falling tries to support himself on his arms, he may easily break them; for, as he possesses clavicles, and needs them, his arms are firmly (without elasticity) connected with the shoulder-girdle, so that the shock in falling is not diminished. The Cat, on the other hand, at every spring alights on the fore-legs. Fracture, however, does not take place, because the shoulder-blades are only connected with the skeleton of the trunk by ligaments and muscles, and yield to the shock (prove on the living animal how easily the shoulder-blades can be moved), and also because yet another safeguard occurs in the shoulder-joint. When the weight of the body comes on the fore-legs, the angle between the upper arm and shoulder-blade is diminished, enlarging again when the bones return to their resting position. (Hence we understand why all swift-running and springing animals have no clavicles)." A similar element of practical reasoning is found throughout the whole of this excellent manual, "made in Germany," and its illustrations will serve to interest as well as instruct.

Introduction to Zoology. By CHARLES BENEDICT DAVENPORT, Ph.D., and GERTRUDE CROTTY DAVENPORT, B.S. New York: The Macmillan Company, Ltd.

THIS publication is intended for the "use of secondary schools"; it "attempts to restore the old-time instruction in Natural History"—in method; it is "the outcome of a conviction that the needs of the secondary student are not best met by a course in comparative anatomy." The book is described "as like a 'Synoptic Room' in the vestibule of a vast museum, containing the most essential things for those who can go in but a little way, but also fundamental for those who can penetrate farther."

It will thus be seen that the authors have set themselves one of the most difficult tasks in the domain of natural science. To really popularise zoology—and the word "popularise" is not synonymic with "vulgarise"—requires the genius of a Huxley. It depends on knowing *all*, and having the faculty of stating clearly the *one thing* needful. To be a college professor is sometimes only the reward of tact and industry; to be a teacher of the people is a gift of the gods. After all, in secondary and other schools, zoology will be best taught by the enthusiastic and competent teacher, who knows how to expound the text-books;

and this, combined with a fair-sized aquarium and vivarium in every school, and a weekly excursion with a good field naturalist, would do for children nearly as much as all the books. Like the people we all meet who quote from the Bible and Shakespeare without ever reading one or the other, so we should have a generation growing up who were at least imbued with an interest in animal life. Once create the love of zoology, and all the rest will follow; a knowledge from books alone is always second-hand. One might as well expect an appreciation of art from Midas because he has purchased a picture gallery.

This book is a means to an end, and will doubtless help on the work. It gives so much information that the space at disposal is not sufficient, in many cases, to elucidate the details, and hence the authors are often, like preachers, a little over the heads of their congregation. The illustrations are apt, but very often borrowed—though with all acknowledgment—and sometimes "after Brehm." Whether illustrations should be taken from the works of the taxidermist is a very open question, even when representing such excellent work as may be found in the Field Columbian Museum. Sometimes the text is a little vague, as when we read that "the Crocodile in the strict sense is found in the Nile and other African rivers," as well as in certain American localities, without any reference to its oriental habitats.

As an appendix, there is a very useful and suggestive outline of laboratory work, and a bibliography of standard works.

In Bird-land with Field-glass and Camera. By Oliver G. Pike. T. Fisher Unwin.

If under the pseudonym of scientific ornithology the ubiquitous collector did much damage in "bird-land," by the indiscriminate acquisition of eggs and nests, science seems now to have provided the antidote in the camera. The lovely photographs of nests and eggs, true to nature, and possessing all the real charms of the environment, which now embellish ornithological literature, will probably create a more exact knowledge of these objects, and prevent much unnecessary destruction. Better that the trade of the dealer should perish than that the birds must ultimately vanish; though the worst destruction of eggs by human agency is, we are thoroughly convinced, occasioned by the boys of the village.

Mr. Pike's photographing-ground has been principally North Middlesex and South Hertfordshire, and he has in this artistic and harmless occupation acquired a very large experience of birds and their ways, which he has related in a small but charmingly illustrated book. The successful placing of the camera is largely dependent on the habits of his "sitters," and not only the nest but the whole environment is reproduced on his plates. We read with regret the usual story of vanishing species from once frequent haunts. He remembers "the time when it was possible to see a Sparrow-Hawk almost any day in our North Middlesex fields; but now a specimen is only seen at very long intervals; for, although I am constantly abroad in the open air, it is over a year since I saw one of these fine birds on the wing." And again:—"Not very many years ago the Raven used to breed in our inland counties; and not far from my home there still stands a tree in which the last pair of these birds built their nest in Middlesex."

Although the collector becomes callous—and we plead guilty to the impeachment—most will regret the truth contained in Mr. Pike's narrative concerning the Sky-lark:—"It is pathetic to hear, as I have done, how this bird, which makes the country-side so enjoyable, will suddenly stop in the midst of its beautiful song when its nest far below is being robbed of its eggs. I was once a witness of this phenomenon, and felt sad as well as indignant." It is probable that the greatest mystery of life is its sorrow; but with birds the camera will not increase it.

As regards the beauty of the illustrations, we can refer to those reproduced in the present number in connection with Mr. Gurney's paper.

Bird Gods. By CHARLES DE KAY. With an Accompaniment of Decorations by G. W. EDWARDS. Harry R. Allenson.

THE aim of this book is apparently to assert "the influence of birds and beasts on what may be called prehistoric religion," as against the more prevalent hypothesis that the planets, their satellites, and other natural phenomena have induced this speculative view. The author asks "whether the primitive mind did not first invest the world of animals with mystery, because they are objects near at hand, within their limited horizon, and only afterwards rise to the point of grasping the heavenly bodies as being endowed with supernatural power?"

This is a purely mythological book, and, like all mythologists, the author must expect little sympathy when he fails to carry conviction. That disjointed but widely-spread custom, the couvade, the explanation of which has so perplexed anthropologists, is here sought to be divined by the aid of the habits of the Cuckoo, which, having been a pagan god, was afterwards "degraded to a devil." The Sphinx is considered as a Greek embroidery upon the Owl, and the author remarks that "we get thus an explanation of the sphinxes on the helmet of the great statue of Pallas Athené in the Parthenon, described by Pausanias. They were merely more elegant and artistic forms of the homely Owl, the bird of Minerva." That birds have entered largely into the old mythologies this book abundantly maintains with many valuable and apt references, but that they have played the part suggested for them by Mr. de Kay will, we venture to think, not be considered proven by all his readers. But, like the Phœnix, the best hypothesis usually arises from the ashes of its predecessors.

Whether the illustrations should be styled "decorations," as on the title-page, is altogether another question. Mr. Allenson's name appears as representing the publisher on the title-page, but A. S. Barnes & Co. is printed on the cover.

EDITORIAL GLEANINGS.

Formaldehyde as an aid in collecting ornithological specimens is the subject of a communication by Mr. Joseph Mailliard to the last number of the 'Auk' for July. It appears that formalin can be procured at a much lower rate under the trade name of "formaldehyde." By its aid the collector is placed in an independent position in regard to the number of specimens he may collect in a day, as with its aid he can keep a number in good condition until time admits of preparing them for his collection. With an old-fashioned veterinary hypodermic syringe, and a bottle of saturated solution of formaldehyde, Mr. Mailliard is now provided on all his expeditions. This syringe holds one teaspoonful, and this is sufficient for a bird as large as a Partridge. The sharp needle is punched into the abdomen in one or more places, a few drops are sent down the throat of a bird to be saved, and, if to be kept for some days, a little is injected into the brain by opening the bill and forcing the needle upwards and backwards between the eyeballs. In place of a regular hypodermic, a common glass syringe, or even an eye-dropper, can be made to answer, especially if the end is heated and drawn out to a sharp point, as in an egg-blower. The amount injected and the strength of the solution must depend upon the size of the bird. Formaldehyde comes in saturated solution of nominally 40 per cent., while from 4 per cent. to 10 per cent. is what may ordinarily be used. For birds up to the size of a Partridge, 4 per cent. is sufficiently strong; from this to the size of a Duck, 8 or 10 per cent.; and for Geese and very large birds a comparatively smaller amount of the full strength seems more satisfactory than a larger amount of a weaker solution. It is well to avoid, as far as possible, having one's hands come in contact with the strong solution, as this is apt to harden the skin of the fingers, and cause cracks, into which arsenic may be introduced. Upon the basis of the original solution being 40 per cent., it is a simple matter to approximate any desired strength by mixing in a separate bottle one part of the solution to so many parts of water roughly estimated. The strength and amount necessary for different birds will soon be learned with a little practice. If too much or too great a strength is used upon small birds, the body becomes more or less hardened and dry, making it exceedingly difficult to skin the specimen. Care must also be taken to avoid using more than is absolutely necessary in the throat, as the thinness of the gullet allows the formaldehyde to act directly upon the skin of the neck, which is apt to become so stiff and dry as to cause it to tear in the effort to skin the bird over the head. A few drops only will suffice for the preservation of this part of the bird, except in the case of a large crop full of decomposing food. When properly treated with this solution, and properly cooled off in the first instance, birds will keep a week even in warm weather in sufficiently good condition to make a fair skin.

DR. ALPHÆUS S. PACKARD, the well-known American entomologist, who is now in London, has ready for the press a volume entitled "Lamarck, the Founder of Evolution; his Life and Work. With Translations of his Writings on Organic Evolution." Dr. Packard has sought and obtained much original material for his publication in France, and the work will probably be published in England.

IN connection with the above, it is interesting to know that Darwin's great work, 'The Origin of Species,' will be out of copyright in about a couple of years, and that the publisher has decided to issue during the coming autumn an edition in large type, well bound and well printed, at a price which will bring it within the reach of all—half-a-crown.

THE monthly magazines still show by their contents that the ordinary reader is interested in the many curious details of animal life. In the June number of 'Pearson's Magazine,' René Bache writes on fish-culture in trains in the U.S.A., and describes the special railway-car used for the transportation of fry and eggs, under the direction of the national "Fish Commission."

Supposing the car is drawn up at one of the Fish Commission's central stations, and the captain of the car is to receive for transportation a cargo of 2,600,000 young Shad, and 400,000 Shad eggs; as quickly as possible the newly-hatched Government Shad will be taken aboard in about one hundred cans resembling milk-cans, each containing 20,000 fish. The eggs, in similar shipping-cans, will be rapidly loaded; the car will be attached to a train, and the journey will commence. The captain of the car and his four trained assistants must account for every one of the 3,000,000 lives entrusted to their care. This is no light responsibility, for young fishes die on slight provocation, and it is not surprising that the captain in charge of them all should be fairly overwhelmed with urgent duties. He has already sent telegrams to the traffic manager of every line over which he is to pass, making arrangements for the hauling of the car, so that there shall not be a moment's unnecessary delay. He has telegraphed in advance to various points on the route for supplies of ice and water, and he has also prepared type-written instructions for each of his subordinates, telling them their precise duties throughout the journey.

As soon as they have been taken on board the young fish are at once examined, and the water in their cans is aerated. This is accomplished by drawing off a certain portion of the water into a suitable receptacle, dipping it up with a dipper, and letting it fall again, so as to mix air with it. Fresh water is added, and ice is put in to chill it to the proper temperature of 60°, when it is returned to the can. This process occupies more than an hour, and must be repeated every two hours. If any of the young fishes are dead they sink to the bottom, and are taken out with a syphon tube.

Meanwhile the 400,000 Shad eggs are transferred from the shipping-cans to the batteries of hatching-jars. The jars are put on shallow trays, which are placed over refrigerating tanks. There are forty-eight jars, each capable of hatching 100,000 eggs at one time. When the hatching apparatus has been set in operation it requires hardly any further attention, a continuous stream of water passing through the jars, and keeping the ova agitated. When hatched the young fish, being lighter than the water, pass out of the receptacles, through syphons, into glass aquaria, from which they may be taken with gauze nets when required.

When the car reaches one of the places on its journey where a consignment of Shad is wanted, an attendant takes perhaps fifteen cans, containing 300,000 fish, drives to the water that is to be stocked, and in the cool of the evening lowers the cans gently into the water, and releases his captives to their first experience of the world. The chances are that one in ten will live to grow up; the remainder will be eaten.

Anything that relates to Gilbert White is of interest to naturalists, and when we have an article by Prof. Newton on "Gilbert White and his Recent Editors" ('Macmillan's Magazine,' July) we know that we shall have sound views, with pungent criticism. And we are not disappointed. The last two editions are certainly not bepraised, and the opinion as to former editions will probably receive general acceptance, though editors have a rough time. As Prof. Newton severely observes:—"The work itself has never suffered from its misusage by editors, of whom it has had so many, a few good, some indifferent, and several bad. If anything be needed to prove White's right to be considered a naturalist of the first order, it may be found in the fact that his most ignorant editor has been unable to degrade him from that rank, and how ignorant some have been would take too long to tell." Some, however, are "regarded as experts, and their work therefore to have real value. Among them are such men as Blyth, Jardine, Rennie, and Bennett, the labours of the last two forming the foundation of the excellent edition (or editions, it must be said) of Mr. Harting; and the late Prof. Bell, who lived for forty years in what had been White's house at Selborne, and, possessing advantages far greater than any of his predecessors or successors, was able to give so much additional information that his edition still remains, and is likely for many years to remain, the standard. His biographical memoir, too, contains more numerous details of the author than had been before accessible; but for a complete Life we must await that which his great-great-nephew, Mr. Holt-White, is understood to have in the press."

Mr. Frank T. Bullen has written in the 'Strand Magazine' for July on the subject of "Sociable Fish." On the question of the sociability of the Pilot-fish with the Shark, the author writes as follows:—

"Does the Pilot-fish love the Shark? Does it even know that the Shark is a Shark, a slow, short-sighted, undiscriminating creature whose chief characteristic is that of never-satisfied hunger? In short, does the Pilot-fish attach itself to the Shark as a pilot, with a definite object in view, or is the attachment merely the result of accident? Let us see.

"Here is a big Shark-hook, upon which we stick a mass of fat pork two or three pounds in weight. Fastening a stout rope to it we drop it over the stern with a splash. The eddies have no sooner smoothed away than we see the brilliant little blue and gold Pilot-fish coming towards our bait at such speed that we can hardly detect the lateral vibrations of his tail. Round and round the bait he goes, evidently in a high state of excitement, and next moment he has darted off again as rapidly as he came. He reaches the Shark, touches him with his head on the nose, and comes whizzing back again to the bait, followed sedately by the dull-coloured monster. As if impatient of his huge companion's slowness, he keeps oscillating between him and the bait until the Shark has reached it, and without hesitation has turned upon his back to seize it, if such a verb can be used to denote the deliberate way in which that gaping crescent of a mouth enfolds the lump of pork. Nothing, you think, can increase the excitement of the little attendant now. He seems ubiquitous, flashing all round the Shark's jaws as if there were twenty of him at least. But when half a dozen men, "tailing on" to the rope, drag the Shark slowly upward out of the sea, the faithful little Pilot seems to go frantic with—what shall we call it?—dread of losing his protector, affection, anger, who can tell? The fact remains that during the whole time occupied in hauling the huge writhing carcase of the Shark up out of the water the Pilot-fish never ceases its distracted upward leaping against the body of his departing companion. And after the Shark has been hauled clear of the water the bereaved Pilot darts disconsolately to and fro about the rudder as if in bewilderment at its great loss."

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